DOCUMENT RESUME

ED 466 140 IR 021 210

AUTHOR	Bradley, Claire; Boyle, Tom
TITLE	The Development of an Online Course for a Virtual University.
PUB DATE	2001-06-00
NOTE	7p.; In: ED-MEDIA 2001 World Conference on Educational Multimedia, Hypermedia & Telecommunications. Proceedings (13th, Tampere, Finland, June 25-30, 2001); see IR 021 194.
PUB TYPE	Reports - Descriptive (141) -- Speeches/Meeting Papers (150)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	*College Curriculum; Computer Assisted Instruction; Computer Mediated Communication; Computer Uses in Education; *Courseware; *Distance Education; Foreign Countries; Graduate Study; Higher Education; Instructional Development; Masters Programs; *Online Courses; Online Systems; *Universities
IDENTIFIERS	England

ABSTRACT

Universities are under increasing pressure to develop a virtual presence in the face of widespread global competition. Online courseware development and delivery presents many exciting opportunities, and brings with it a number of challenges to be overcome. This case study describes some of the experiences of the European Union-funded TISCAM (Training for Innovation in Supply Chain Management) project, which developed an online Master's-level course in supply chain management for work-based learners. The project involved a number of partners and multiple development teams working in parallel. Some of the issues and challenges faced as a result of this development model are discussed, and resulting lessons are presented. (Author/AEF)

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ED 466 140

The Development of an Online Course for a Virtual University

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Claire Bradley
Learning Technology Research Institute
University of North London
166-220 Holloway Road
London
c.bradley@unl.ac.uk

Tom Boyle
Learning Technology Research Institute
University of North London
166-220 Holloway Road
London
t.boyle@unl.ac.uk

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Abstract: Universities are under increasing pressure to develop a virtual presence in the face of widespread global competition. Online courseware development and delivery presents many exciting opportunities, and brings with it a number of challenges to be overcome. This case study describes some of the experiences of the EU funded TISCAM project, which developed an online masters-level course in supply chain management for work-based learners. The project involved a number of partners and multiple development teams working in parallel. Some of the issues and challenges faced as a result of this development model will be discussed, and resulting lessons presented.

Introduction

This case study outlines the development of online course materials within the context of a virtual university. The transformation of traditionally delivered courses into online versions can be a steep learning curve for all concerned. This paper will illustrate some of the experiences and lessons that have emerged from this research project. It should provide valuable insights for those engaging in large-scale virtual university development and delivery.

There are a number of significant challenges that the project had to face.

- The scale of the project, involving a number of partners and universities in the UK and in Europe, with a number of authors developing the material.
- Many of the authors were subject specialists, but did not necessarily have experience of producing courseware that could be delivered effectively online.
- The materials had to be vocationally relevant, academically rigorous, and allow pathways for learners to seek accreditation for their studies. The resulting course had to be capable of online delivery to learners in their workplace.
- There is a tension between the desire to design innovative systems and materials, and at the same time to maintain a realistic and practical hold on the project and the achievement of its goals.

This paper will discuss these challenges and how they were tackled.

The TISCAM Project

The TISCAM project (Training for Innovation in Supply Chain Management) is a large European-funded initiative involving a number of partners. It offers masters-level courses in supply chain management to learners

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in the workplace. Delivered through a virtual university framework, learners have access to materials, expertise and tuition from some of the key university providers in this field, irrespective of their geographical location. The target learners are managers in small and medium sized enterprises (SMEs), who are generally characterised by having small training budgets and limited release time to study full-time or block release courses away from work. The modular structure devised, allows a number of study pathways to be followed. Managers may have a specific personal or organisational training need within the context of supply chain management, or they may want to gain an accredited award – either can be accommodated.

Course materials were developed by a series of expert teams (see Fig. 1 below for an illustration of this structure). A central management team was responsible for the overall management and scheduling of the project. Authors from a number of universities produced the material, with guidance and support from development teams. The pedagogy support team provided advice and quality control on the effectiveness of the learning materials produced. The academic review team approved material for its curriculum suitability, and monitored subject coverage from one module to another. The technical team developed the delivery system, and worked with authors on the technical development of their materials, transforming them for online delivery, after approval by the pedagogic and academic reviewers.

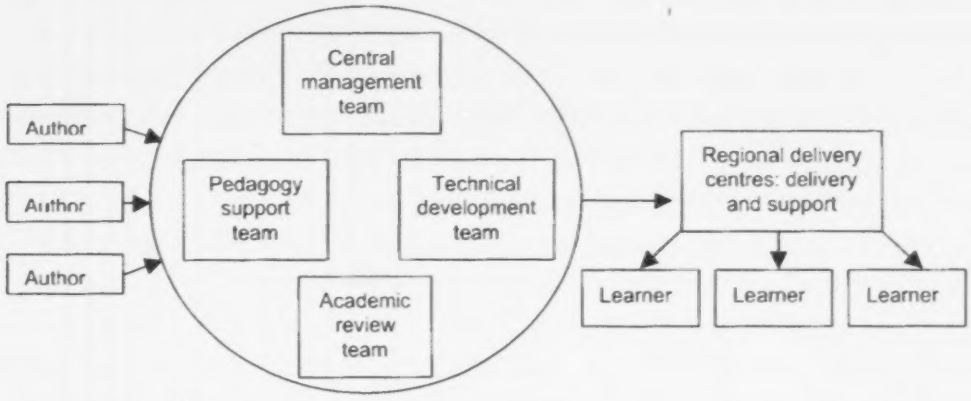

Figure 1: The development and delivery model

Learners receive support from a range of specialists, each with their own expertise (Anderson & Oliver, 1999). They register at a Regional Delivery Centre where guidance is provided. Online support is available from a tutor with subject-specific expertise, and also from specialists providing technical and administrative support. In-company support is provided by a mentor, who gives guidance and support on work-based issues, helping the learner complete work-based activities, and to apply what they are learning within their company.

Initially, 12 modules were developed. Each module constitutes 100 hours of study, and is broken down into 10 units, of approximately 10 hours study time each. This includes: working through the materials; carrying out and completing activities and assessments; building up a portfolio; engaging in online discussion groups; reading case studies and related materials.

In developing processes to meet these developmental aims and characteristics of the project, a number of issues emerged. The paper will discuss some of these issues and challenges and how they were met. This discussion is organised around two main themes: developing large-scale online courses, and the reality of developing materials for an innovative delivery system, given the scale and constraints of the project. It will then move on to describe the resulting system and materials, and conclude with the key lessons learnt.

Large-scale Distributed Development of Online Courses

The project required a development process that could accommodate large-scale distributed development. The expert teams were based in separate geographical locations, as were the authors. In some universities there was a team of authors working on each module, requiring a co-ordinator to liaise between the individual authors and the development teams. The development process adopted was an 'industrialised model', in which a chain of experts each plays their part in the process. This is in contrast to the 'craft' model more familiar to lecturers, who are accustomed to designing and delivering traditional courses themselves (Peters, 1998).

Authors were selected on the basis of their subject expertise, and were invariably lecturers or researchers, who lacked hands-on experience of online courseware design. In view of this, they required ongoing help and guidance during the authoring process. Early on in the project a series of meetings were held, in which the pedagogy support team, technical development team, authors and project managers met. These meetings began to formulate operational frameworks and agree methods of working. Communication and distribution of materials was largely conducted by email, with face-to-face meetings held in a central location at periodic intervals.

The development of a pedagogic framework was identified as being important to underpin development in what, for many authors, was a new medium for learning delivery, and this became a subject of much discussion in early meetings. The pedagogy support team presented a number of approaches that could be adopted by the project, following an analysis of learner needs. This emphasised the need for motivating, vocationally relevant learning that could be undertaken in short periods of 'release' time within the company environment. A socio-constructivist approach was eventually adopted, which drew on Laurillard's conversational framework (Laurillard, 1993), but was adapted for course design (Conole & Oliver, 1998).

To enhance shared understanding amongst the project teams, a series of guidelines were produced for each key player: for authors (Oliver & Conole, 1999), tutors, in-company mentors, regional facilitators (Anderson & Oliver, 1999) and also for the learners (Anderson & Oliver, 2000). These guidelines gave an agreed description of each role, and acted as minimum specifications for delivery, based on existing good practice drawn from the field of distance and online learning.

The guidelines for authors were designed to perform a crucial role in helping them to work with the new challenges they faced in developing online courseware. They incorporated:

- The context of authoring for the project
- The pedagogic framework
- The learner support framework
- Guidance on preparing units, using multimedia, incorporating peer group discussion, designing activities and assessment methods
- A template for specifying the aims, objectives, learning outcomes, learning methods and assessment methods of each unit
- The process for submitting drafts and acceptable formats.

The authoring process devised incorporated a number of stages. Authors draft units were submitted to the pedagogic and academic review teams for approval that the required standards had been met. The academic reviewer checked that the subject matter was adequately covered, and didn't overlap significantly with other modules. The pedagogic review examined the draft in terms of its effectiveness as learning material, and feedback was provided to reinforce successful attributes and suggest improvements to address weaknesses. At the same time the technical developers reviewed the material, to ensure that authors were making appropriate and realistic uses of the available technologies. If revisions were required, the author was responsible for undertaking them, and re-submitting the unit for approval. Once each unit had been 'signed off' by each reviewer, it was passed to the technical development team to transform it into online material. Peer review amongst authors was also encouraged, enabling them to share experiences and learn from each other's practice.

The Reality of Developing Materials for an Innovative Delivery System

On receipt of the first few drafts, it became apparent that authors were not designing materials according to the guidelines, continuing to work in the style most familiar to them. Much of the material resembled extended text books or teaching notes, with notable exceptions from authors with wider experiences of different teaching and learning practices. This resulted in an interesting diversity of materials, but an overall lack of consistency from one module to another. It emerged that one reason for the lack of a common approach was that the pedagogic model adopted, based on Laurillard's conversational framework, was unfamiliar to the authors (Laurillard, 1993). It was agreed that the model used should provide concrete recommendations on the structure of the materials, and should be familiar to all authors. Instead, Kolb's experiential learning cycle was adopted as the basis for unit development (Kolb, 1984). However, even after this, authors differed significantly in the material they produced - a clear example of the difference between espoused theories and theories-in-use.

The whole drafting and review process took longer than was anticipated, and threatened to extend beyond the time-scale permitted by the project. Authors' drafts took longer to produce, and the pedagogic reviewers found they needed to make a lot of suggestions for improvements to the materials. A number of solutions were devised to improve the situation. Firstly the author's guidelines were tightened to incorporate a more clearly defined specification for authors, including structural considerations for the online delivery system, and criteria they should meet for the pedagogic and academic reviews. The amount of support and guidance for authors was increased. Meetings for authors and the development teams were held more frequently, giving opportunities for development workshops to be held and more time for the discussion of guidelines and issues being encountered. Examples of good practice were shared amongst authors, to help them to overcome common areas of difficulty, e.g. good examples of model activity answers and self-assessment questions.

A further development was that the technical team devised a set of templates for activities that could be re-used within the materials. This served three purposes. Firstly, it provided examples of how web technologies could be utilised to produce more interactive and visual forms of activities for authors who were struggling to make full use of the capabilities of the online medium. Secondly, it made it easier for authors to incorporate self-assessment activities which had computer generated feedback. Thirdly, it helped cut down the development time required for the technical team, as they could re-use the basic structure and code from one unit to another.

Maintaining the schedule and balance of the workflow became critical at times during the development process. Authors had agreed deadlines for the submission of units with the project manager, and the whole process was designed on the premise that they would submit units on an individual and regular basis. This enabled the reviewers to complete their task within the agreed time-scale of 10 working days and the technical team to have a steady flow of material to develop. However, some authors submitted several units together, which for the pedagogic review could make the process easier, as authors invariably developed a style, and units were likely to have common strengths and weaknesses which enabled common feedback to be given across a number of units. Any corrective action required of authors however, could result in substantial revision across a number of units. Several authors also fell behind schedule, so that when the final submission deadline arrived, they suddenly submitted their outstanding units en masse. This created a bottleneck at the review stage, resulting in a delay in the provision of feedback. At times when the flow of materials was not steady, the result was that there was not enough material to keep the review and technical teams fully employed, or alternatively, there was too much. There was a need for tighter control of the workflow, coupled with a greater awareness amongst all the development teams of the effects of missing deadlines on the balance of the entire production process.

Any project of this scale which attempts to develop innovative delivery systems based on good practice models will inevitably need to keep a close eye on practical concerns as development progresses. Initial ideals may need to be scaled down to suit practical and operational requirements and plans will constantly need to be evaluated and refined as issues arise and deadlines approach.

The Results

The technical development team created a bespoke online delivery system, providing the course materials with an overall consistent structure and functionality. Each module unit was divided into a number of sections, ideally between 4 and 6, which provided manageable amounts of material for individual learning sessions, around a particular topic. Within each section the material is separated into content, related material, case studies and activities, each accessible through a series of 'tabs' along the top of the screen. Other tabs provide access to additional services for learners: 'community' includes communication facilities between the tutor and contains the learner's portfolio compiled from their activity responses, a study guide and access to support services.

This structure enables learners to construct their own pathways through the materials. The author guides the learners through the material according to their suggested route, but learners can also make their own choices of what material they look at and when they look at it. Because content, activities and related materials are presented separately, learners can for example choose to attempt all the activities first if they have a lot of experience in that area, or they can skim through the content and go straight to the case studies to find out about real-life examples. The result is a hyperstructure, a highly user-centred model which allows the users to have considerable freedom of access through a network of nodes of content and to pursue non-linear pathways through it (Boyle, 1997).

Orientation is provided for users in a number of ways, helping them to identify their location within the materials. The system only allows access through the tabs to materials within that section, so the user can't accidentally navigate off to another part of the unit. Information at the bottom of the screen tells the user which module, unit and section they are currently accessing.

Technically, the materials utilise widely available web technologies to enhance and support the learning process. Graphics are animated where this is appropriate, for example to illustrate process flows. Activities include text input boxes, or allow attached files to be uploaded to the system database. Learner's responses to activities are automatically stored in their portfolio, which is available for them, their tutor, or their mentor to view through the 'student services' tab. The development of a portfolio allows learners to build up a record of their work on the course and their achievements, which is common practice in vocational training.

Conclusions

A number of lessons can be drawn from this project which will be helpful for anyone engaged in the large-scale development of on-line courses. The production and delivery of online courseware can impose a steep learning curve for all concerned. New skills and expertise may need to be developed by a number of participants in a range of areas, and the sharing of expertise, in conjunction with ongoing guidance and support is important to ensure success.

Development models and processes need to be established which meet the diverse needs of project partners and the project as a whole. However, these may be alien to some participants, and it is important that shared understanding is achieved, and to acknowledge that refinement may be necessary if this does not result. Participants also need to understand and respect the roles and requirements of others within the process, so that schedules and work flows are maintained and the shared goals of the project can be achieved.

Ultimately, compromises between the pursuit of innovation and the achievement of effective delivery inevitably have to be made, in order that such a project meets its objectives within the resources and time-scale permitted.

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